DUPLICATE

COLONY OF SOUTHERN RHODESIA.

REPORT

OF THE

Director of Agriculture

For the Year 1923.

IMPERIAL BUREAU OF MYCOLOGY

Presented to the Legislative Assembly,
1924.

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I have the honour to present a report on agriculture in Southern Rhodesia for the year 1923.

Conditions in 1923.—The season commenced most favourably, and proved a record one for most crops, whilst the condition of cattle has been remarkably well maintained.

The year opened with good rains well distributed and equal to or in excess of normal, followed by a superabundance of rain which, though it was followed by heavy crops, was much more than enough; better yields would have been obtained from less rain. The winter was mild and free from spells of severe cold, with little frost, ample water, and veld fires less in evidence than usual. The end of the year, which includes the prelude to the coming season, was disappointing, and there was grave anxiety owing to late and deficient rains, low prices and little demand, poor prospects for stock for the coming winter. The early rains were late, erratic and inadequate, and the last two months of the year proved unusually hot and dry, and trying alike to man, beast, crops and herbage.

The retarding influence of the financial stringency and lack of security throughout the world has been felt acutely in our young and but partially developed Colony. Markets have not taken our products at profitable prices in the manner hoped for and necessary to enable our farmers to carry on. The result has been a severe set-back to many individuals, a few of whom have been obliged to assign their estates, whilst many more are embarrassed, and are only able to continue through the good will of their creditors, the financial houses and merchants who have confidence in the men and the country.

The general revision of rates and classification over the Beira and Mashonaland and Rhodesia Railways which took effect from 1st October includes material reductions in the rates for various agricultural commodities and live stock. Thus, the rate on fencing material from Beira to Salisbury has been reduced from 3s. 5d. per 100 lbs. to 1s. 8d. per 100 lbs. The rate on fertilisers from Beira to Salisbury is now 197 pence a ton, as against 296 pence formerly; from Natal, the rate of fertilisers has been reduced from 64s. a ton to 53s. 11d., and from the Cape from 66s. to 56s. 2d. The rate on salt from one point in the Union has been reduced from £5 7s. 9d. a ton to £3 9s., and from another point from £4 15s. 1d. to £2 13s. 9d. The existing export rates for maize and maize meal *via* Beira and to the Union remain unaltered, but for other descriptions of agricultural produce lower export rates, both overseas and to the Union, are being granted, and the local rates also for this traffic were brought down to a much lower level. The rates on live stock remain the same for distances up to 500 miles, but for each ten miles beyond 500 miles the rate is 2s. instead of 4s. The reductions amount

to £5 18s. per short truck between Bulawayo and the Congo border, and £3 per short truck between Salisbury and Mafeking. These adjustments will afford a certain amount of relief in these times of stress, and will be much appreciated by the farming community.

Markets.—It is imperative to find new or to improve old markets, and efforts are being made to do so. The position is grave. The agricultural development of Southern Rhodesia has now reached a position in which the methods of production in regard to a considerable variety of articles are fairly well understood, so that, given outlets, large quantities could readily be assured and of a quality known to be commercially satisfactory. Until such production could be guaranteed, it was useless to attempt to seek markets. The whole of South Africa already has an unenviable reputation for the production of samples, and until truck loads, train loads or cargoes could be delivered, it was hopeless to discuss prices. Now, however, the farmer is awaiting only the buyer's assurance that he will purchase the crop when grown, but there is necessarily a hitch, as the farmer must have some reasonable prospect of selling it before committing himself to produce any particular crop or animal product. Previously there was much uncertainty as to whether and how these things could be produced; now, very largely, we know, but are faced with the problem of how to sell them when produced.

The most important need is an outlet in any form for our cattle, and it is impossible to exaggerate the importance to Rhodesia of an early solution of this problem. This subject has received much public attention during the year, as well as consideration by the Government and a Committee appointed specially to enquire into the matter. The Committee's reports formulate the basis for the establishment of markets for our cattle and for the encouragement of the cattle industry. The matter has been thoroughly threshed out, and it only remains to put in operation the various decisions reached.

Whilst in England on leave, Mr. Mundy enquired into the markets for maize, ground nuts and beans. Developments of importance have taken place in connection with the markets for tobacco and oranges. Cotton has, owing to market conditions, aroused a new interest. Cheese and butter are rapidly becoming staple exports. Eggs, through the egg circle, are securing markets beyond our borders, and the same tale may be continued indefinitely. The main problem of the moment is to find markets in order that our production may further expand and prosperity follow. Markets have to be sought, and a tendency seems to be growing in the direction of seeking them in foreign countries. Thus our cattle appear more likely to find an outlet in Europe than in Great Britain, our maize and other grain have been investigated by visiting agents from the Continent, whilst enquiries made by our own representatives in London are met with adverse replies, owing to existing connections and supplies from foreign countries, from Argentina to China. On the other hand, we are expected to support British industries, even when commodities can be obtained on better terms elsewhere. These anomalous conditions have been observed for some years and do not appear to be improving. Happily, in regard to the quality of our products there is no adverse criticism, and as the quantities available increase, they are more likely to attract attention and to command a market on their merits, whether at Home, in the Union or in foreign countries.

The Cattle Industry.—The outlook of the cattle interests in Southern Rhodesia is far from satisfactory. The cattle owners have been

much exercised during the year by the low prices obtainable for anything but the best, by the increasing local glut of inferior stock, by the threatened embargo in respect of Union markets, by the collapse of the co-operative effort known as the Meat Produce Exchange, and by the prohibition of the import from Southern Rhodesia of breeding stock into the Union. Disappointment too was felt at the outcome of the effort of the Bullot Meat Preservation Company to open a market for treated meat in the Congo.

The following quotations from Messrs. Weddel's thirty-sixth Annual Review of the Frozen Meat Trade may be permitted on account of their direct application to Rhodesian conditions :—

> "From an Empire point of view it is disconcerting to find that our supplies of meat from the British Dominions are shrinking, while foreign supplies are increasing rapidly. Out of 933,669 tons of beef, mutton and lamb (fresh and refrigerated) imported into Great Britain last year, only 263,214 tons or 28 per cent. were produced within the Empire. In 1922 the proportion was 35 per cent. and in 1920 it was 43 per cent."

And again :—

> "South Africa.—Drought and locusts were again responsible for unfavourable conditions throughout the Union of South Africa and in Rhodesia. Small shipments of beef were made from time to time, chiefly to the Continent, amounting in all to 363 tons, as compared with 300 tons in 1922 and 950 tons in 1921; but for the time being South Africa may be ruled out as a possible supplier of meat, the present prices ruling at this end giving the farmers no encouragement to breed the proper type or to organise the industry. As a potential source of Empire supply, however, certain parts of South Africa possess immense possibilities. The 11,800,000 head of cattle there form a valuable nucleus from which an imported trade might be built up, if any hope of a profitable return could be held out."

The passage above quoted is accurate, except for the reference to drought and locusts in Rhodesia in the year 1923. The admission that the cattle of South Africa are sufficient to form a nucleus on which to build up a trade does not advance the matter, because cattle, once brought to maturity, become a wasting asset which cannot be held over indefinitely until an import trade into Great Britain has been arranged. Our producers will be forced to look elsewhere for an outlet, and South Africa through the Governments and its own commercial channels has already, to some extent, prepared the way for the disposal of such part of the surplus of the eleven millions as is saleable overseas. It seems a pity that no effort should be made by Great Britain to secure the reciprocal trade that would result if she purchased South African cattle in preference to the foreign article, for it is inevitable that, if we are driven into foreign markets to sell our cattle, we shall be in turn compelled to buy our requirements there also. Little as we may desire it, the volume of trade between ourselves and the Old Country must thus suffer loss.

During the year 1923 the Union Government adopted the principle of a subsidy on beef or live cattle exported overseas, and we agreed to a like action in the case of any beef or cattle of Southern Rhodesian origin. The effect of such a policy cannot but be beneficial to cattle raisers, and it is unfortunate that, owing to the lack of facilities on our part, we were not able to take advantage of the measure which came somewhat unexpectedly upon us.

The Government, recognising the grave position of the cattle industry and the urgency of dealing with it effectually and promptly, appointed in 1922 a Committee of Enquiry which, after very thorough investigation, presented a report of which, for convenience, the concluding paragraphs are here quoted :—

"The Committee has been impelled to transmit this report to Government before its enquiries are completed, because the evidence so far obtained convinces it that, unless the recommendations put forward to deal with the present position by the expansion of local consumption, by boiling-down and freezing works, and by instituting active enquiries in regard to certain other markets are adopted at once, the situation, already grave, will become disastrous.

"The Committee has not yet exhausted the field of its enquiries, and realises that points dealt with, and others, have still to be more fully considered. Further evidence will be welcomed, particularly suggestions for increasing our markets and information in regard to further outlets, large or small.

"*Summary of Recommendations.*—Without repeating the argument, we beg, in conclusion, to set out in condensed form our various recommendations to Government to date, and commend them to its earnest consideration :—

(1) That the present highly critical situation calls for Government intervention involving expenditure (section 7).

(2) That development of markets is of the first importance, primarily in Europe, but also elsewhere overseas, and to inland countries wherever a demand exists; and that it is the function of the Government to assist private enterprise to achieve this end by every means possible (section 5).

(3) That, with this end in view, the Government invite representatives of meat packing concerns throughout the world to visit Southern Rhodesia for the purpose of satisfying themselves as to the quality of our cattle, and studying on the spot the prospects of establishing meat works here. Attention is called to the propaganda of the South African Trade Association, London, in this connection (section 12).

(4) That the Government should immediately invite, by world-wide advertisement, competent capitalists to enter upon the business of meat export from Southern Rhodesia, and to that end afford them every assistance within its power (section 11), including :—

I. remission of taxation for a period of years (section 7 (c));

II. exemption from Customs dues (section 7 (c));

III. exclusive rights of oversea export for a certain time (section 7 (d));

IV. bounties on meat exported (section 7 (f));

V. support in requests for port facilities (section 7 (g));

VI. railway advantages (section 7 (h));

VII. favourable ocean freights (section 7 (i));

VIII. assistance from municipalities and local authorities (section 7 (b));

IX. assurance as to duration of privileges (section 7 (j)).

(5) That legislation is called for at an early date relating to control and inspection of meat and of meat works before these are established (section 7 (j)).

(6) That enquiries be instituted by personal investigations on behalf of Government as to the possibilities of extending our markets in the Belgian Congo (section 17).

(7) That no cattle should be permitted to be exported by rail to places outside Southern Rhodesia until they have been inspected by competent veterinary inspectors and a certificate granted that they are fit to stand the journey without undue deterioration or cruelty (section 4 (c)).

(8) That steps be taken by Government with a view to the removal of the present restrictions on the passage of cattle by rail through Northern Rhodesia to the Congo (section 4 (c)).

(9) That the present obligatory rations to natives be modified by the substitution of one pound of meat weekly for two pounds of beans (section 5 (c)).

(10) That special delegates be despatched to Mauritius and Egypt to ascertain the prospects of obtaining outlets for our cattle, alive or as beef (section 5 (d)).

(11) That the investigations of the Committee on a number of subjects of importance be extended to the Union of South Africa through visits by a sub-committee (section 15).

(12) That a representative of the Government be despatched to make enquiries into the cattle industry and the meat export trade of Madagascar (section 16).

(13) That a system of loans be adopted to encourage the use of superior bulls (section 18).

(14) That the Fencing Ordinance be applied throughout the country, deleting the element of local option, and that the law be otherwise amended (section 19).

(15) That a system of fencing loans on the lines of loans under the Water Law be adopted (section 20).

(16) Recommendations in regard to reductions in railway rates on fencing and on live stock are receiving favourable consideration (sections 21 and 22).

(17) That stock advisers be appointed to give practical assistance to farmers (section 23).

(18) That special attention be devoted to instruction in the care and handling of cattle at the Primary School of Agriculture, Matopos (section 23).

(19) That more active educational propaganda in support of the cattle industry be undertaken by the Government (section 23).

(20) That Government stud farms be maintained (section 24).

(21) That the potentialities of Southern Rhodesia as a cattle country be advertised at the Imperial Exhibition in 1924 (section 25).

(22) That the Government keep in touch with the proposed International Cattle Breeders' Congress in Holland in August, 1923 (section 26).

"The present and potential markets for the cattle of Southern Rhodesia may be briefly recapitulated as follows:—

Present markets:—

Local consumption	90,000 head
Union of South Africa—slaughter	15,000 ,,
Katanga (Congo)—slaughter	3,000 ,,
breeding	500 ,,
Northern Rhodesia—breeding	Nominal
Mozambique Co.'s Territory—slaughter and breeding	1,000 ,,

Possible future markets:—

Kasai, etc. (Congo)—slaughter.
Nyasaland—breeding.
Canning Factory—slaughter.
England—slaughter.
Europe—slaughter.
Egypt—slaughter.
Mauritius—slaughter and draught.
Boiling-down Works—slaughter.
Meat Extraction—slaughter."

The members of the Committee were Dr. Eric A. Nobbs (Chairman), Messrs. M. E. Cleveland, C. S. Jobling, H. U. Moffat, M.L.C., and O. C. Rawson.

This report was dealt with by the Legislative Council, on the motion of Mr. R. D. Gilchrist: "That this Council requests the Government to take into consideration the desirability of making financial provision for giving immediate effect to the recommendation made by the Committee of Enquiry, and otherwise, in respect of the cattle industry of Southern Rhodesia." The resolution was carried after a prolonged but favourable discussion, and the report of the Committee was well received throughout the country.

The members of the Committee continued their labours, visited the principal cattle centres of the Union, obtaining valuable evidence there, and submitted a further report in which they dealt with certain matters which they regarded as of the utmost urgency, and made far-reaching recommendations to the Government.

The following figures show the increase in cattle of recent years, including both European-owned and native-owned:—

Year.	No. of cattle at 31st December.	Net increase during year.
1916	960,026	—
1917	1,083,943	12.9 per cent.
1918	1,210,547	11.7 ,,
1919	1,331,284	10.0 ,,
1920	1,517,293	14.0 ,,
1921	1,750,538	15.4 ,,
1922	1,801,145	2.9 ,,
1923	1,920,951	6.6 ,,

It will be observed from the above table that during the past two years there has been a grave fall in the rate of increase of our cattle. This is undoubtedly brought about by want of markets. Seasons have not been unfavourable. Losses from disease were not abnormally heavy. Exports of cattle have fluctuated, but do not amount in the aggregate to any serious figure as yet, as the attached returns show, and the export

for the year of 34,841 head is by no means a large proportion of the whole. Spaying, so far as it has been practised, may have prevented the increase of several thousand head annually, and it is alleged that in some cases calves are being killed. The main reason for the discouraging position disclosed lies in the fact that the care of cattle costs money in wages and dip, and increased herds entail extra cost of management and extra income tax charges. As long as there are no adequate markets, no prospects, and no ready money from sales, there is no inducement to add to the liabilities involved in keeping cattle. For these reasons quite a number of cattlemen, including some of the most prominent, have purposely refrained from allowing their cows to breed. The practice is already having an effect on the birth-rate, and the set-back so caused must have a detrimental influence on the numbers of cattle in years to come and to generations yet unborn. This is most sincerely to be deplored in a country which is so far from being fully stocked. Statistical returns show, in place of the normal increase in bulls in use, an actual decrease from 11,056 in 1922 to 10,087 in 1923, which implies a big reduction in next season's calving. Such stagnation is contrary to the best interests of the country, retards land settlement, reduces land values, and is injurious to the progress and prosperity of all sections of the inhabitants.

It is noteworthy that the prices of frozen beef from the principal producing countries of the world were generally higher in 1923 than in the last year prior to the war, as the following figures taken from Messrs. Weddel's Annual Review for 1923 disclose:—

Frozen beef.	1913.	1923.
Australian (fores) ...	$3\frac{1}{4}$ pence per pound	$3\frac{1}{2}$ pence per pound
Australian (hinds) ...	4 „ „	$4\frac{5}{8}$ „ „
New Zealand (fores)	$3\frac{1}{4}$ „ „	$3\frac{1}{8}$ „ „
New Zealand (hinds)	4 „ „	$4\frac{3}{4}$ „ „
Argentine (fores) ...	$3\frac{1}{4}$ „ „	$3\frac{3}{8}$ „ „
Argentine (hinds) ...	4 „ „	$5\frac{1}{4}$ „ „

From the above figures it would not appear to be so much the prices that are unfavourable as that we lack facilities for reaching those markets. At the same time export prices are and will be lower than those we have been accustomed to for local consumption. With cattle—as with maize, tobacco, cheese, butter or any other of our products—the price obtainable ultimately depends upon the world's markets, not upon local conditions. Attention will have to be devoted to the best means of getting our cattle sold, whether alive, frozen, chilled, tinned or boiled down; and the price obtained must depend on the world-wide conditions, not upon local ideas of value.

The European-owned cattle are still under one million, a figure which normally they might have been expected to have reached in 1922. The number at 31st December, 1923, was 993,608, a net increase for the year of only 6.1 per cent. An examination of the returns furnished by owners of five hundred head and upwards, of whom there are 401 in the country, shows 124 with fewer head than they owned a year before, whilst very many have a trivial increase only. Local consumption is estimated in the region of 90,000 head, giving with export in round figures 125,000 head, or about one-sixteenth of our total stock, which, even for a country using oxen for draught purposes, is too low a proportion.

The position of cattle owners therefore is highly critical. Without prospects of markets, there is no inducement to increase the herds or

to improve the quality of our stock. The value of cattle has fallen; the mere maintenance charges are out of all proportion to the prices obtainable to-day, hence the commonly heard phrase, "that cattle are a liability and not an asset." This most unfortunate situation has arisen solely owing to want of markets; in all other respects the position is eminently sound. The problem is not intricate, and the simple solution lies in the development of overseas markets. This, however, entails commercial organisation, technical skill and provision of facilities extending from the point of origin to the point of consumption. To organise and conduct such a comprehensive manufacturing, distributing and storing industry of a highly specialised character requires capital and experience. There is as yet in Rhodesia no existing machinery for conducting an intricate business of this sort.

Exports of cattle to all countries for the past few years are shown below :—

1916	12,815
1917	13,221
1918	23,672
1919	27,735
1920	37,285
1921	12,408
1922	23,938
1923	34,841

Nyasaland places no difficulties in the way of importation of stock from Southern Rhodesia, merely imposing reasonable quarantine rules on animals after arrival which it is comparatively easy for the recipient at that end to comply with, whilst the consignor has only to provide veterinary certificates from here.

The exports of cattle to the Union of South Africa comprised 32,251 head of slaughter stock to the Rand and 1,064 breeding cows and calves. To the Mozambique Company's Territory we sent only 64 oxen for draught; no slaughter cattle as such, and 668 bulls, cows and calves. The Congo took 659 head of breeding stock only, Northern Rhodesia bought 125 breeding animals and Nyasaland made a commencement with ten head of Friesland cattle.

Importations consist entirely of superior breeding stock, 255 bulls and 251 heifers from the Union, 6 bulls and 8 heifers from the British Isles, in all 520 head. The importation of bulls and cows during recent years has been diminishing and has now fallen to a low figure.

	From Great Britain.	From the Union.	Total.
1917	238	2,766	3,004
1918	155	863	1,018
1919	118	836	954
1920	172	789	961
1921	58	949	1,007
1922	22	690	712
1923	14	506	520

These figures disclose a serious and disappointing tendency. Improvement is obviously not being pressed forward vigorously, and indeed of this there is ample evidence in our cattle markets and in our herds. The price of pedigree bulls has fallen, yet the demand has not kept up nor improved, as there is little or no incentive to breed better stock. It is apparent that the discouraging prices, lack of present markets and absence of prospects for the future are preventing stock owners from actively improving the quality of their stock, as well as affecting

adversely their normal increase as indicated above. The high-class stock already in the country is of course an influence for good. The number of cattle returned by farmers as pure bred, not necessarily pedigreed, is 9,950, as against 8,834 a year before. Of these it is interesting to find that there are 663 Afrikander bulls, 656 Shorthorn bulls, 654 Hereford bulls, 382 Devon bulls, 341 Aberdeen Angus bulls, 195 Sussex bulls, 189 Lincoln Red bulls and 277 Friesland bulls, giving a general indication of the relative popularity of these breeds.

An operation, and one which deserves to be much more generally practised, especially in the case of higher grade stock, is the dehorning of calves, which, besides preventing many injuries, is calculated to assist the fattening process both on the veld and in stalls, by rendering the animals harmless to each other and peaceable and quiet.

A series of cattle feeding experiments have been in progress for some years at the Government Farm, Gwebi. So far, in all, 346 head have been fattened, and in the process a considerable fund of useful information collected, which has been made public from time to time. It may be claimed that a practical system has now been devised under which, using only the foodstuffs procurable on any average arable farm, cattle can be brought in about fifteen weeks into prime condition, gaining in weight during the process at an average rate of about two pounds daily per head. The particular trials carried out during the year comprised a comparison of grade cattle of various breeds, a comparison of oxen and cows and a test of sweet potatoes as against maize, this last experiment proving most instructive, and suggesting new means of cheaply fattening cattle for market.

Dairying.—In spite of an adverse season, the Dairy Expert is able to report material progress in the industry committed to his charge. As a direct result of the difficulties in the way of selling slaughter cattle, attention is being forced towards dairying. This, in the case of the smaller man, is a most desirable development. The local market for cheese has not in the past been fully supplied from local sources, but now, not only has our own cheese secured a ready sale within our own borders, but for the first time it has been exported to the Union and other adjoining territories. The standard of quality is entirely satisfactory. The number of cheese factories has increased from seven in 1922 to twenty-four in 1923, and production of cheese has risen from 39,000 pounds to 107,470 pounds. These factories are mainly on a farm scale as yet, but several are buying milk from neighbours. As those engaged in this work are largely novices with little or no experience, they require and are very appreciative of instruction given them by personal visits on the part of our expert. There is, of course, much room for improvement, especially as regards accommodation and methods, but this will follow after the possibilities of production have been proved, as is now being done. Systematic grading of cheese has been introduced, with very great advantage to producer, retailer and consumer.

An important development of the dairy industry is observable in the increase of creamery butter, as against the farm-made article, and this in spite of the adverse season. No doubt realisation of the superiority of factory butter is leading to this result, also the attractive figure paid out by the factories month by month for butter fat, as against the troubles and worries of churning at home. A few farms where the best methods have been followed, and which have created a local demand for their own brand, continue to command a special price, but as against two in 1922 there were in 1923 four creameries in active existence in Southern Rhodesia:—The Gwelo Creamery, the Farmers' Co-op.

Creamery Depot, Salisbury, the Rhodesia Co-operative Creamery, Bulawayo, and the Model Dairy, Bulawayo, operating in all six power churns of a capacity of from 1,000 to 2,000 pounds of butter per day. The output of these creameries was 554,206 pounds of butter in 1923, as against 282,850 pounds in 1922; whilst of farm butter 338,343 pounds have to be added, giving a total production of 892,549 pounds of butter.

Improvement of dairy stock has been conspicuous, and the demand for good milking cows and for high-class bulls, particularly of the Friesland breed, is noticeable, largely as a result of the activities of the Friesland Breeders' Association in calling attention to the merits of that breed and in assisting farmers to procure them.

There is much yet to be learnt regarding dairying in Rhodesia, but this is not being neglected. The Department of Agriculture has made a special study of the composition of cow's milk in winter as provided to towns, and is co-operating with a number of farmers in taking records of the production of dairy herds, with a view to improving individual production and discarding unprofitable animals. Besides this, instruction is being continuously given by means of visits, addresses and demonstrations. An improvement is manifest amongst farmers in the care and treatment of their cows and the hand rearing of their calves, as well as in the attention given to the milk and its various products. Another good sign is the increasing attention to hygiene and cleanliness on the part of those supplying fresh milk to towns, stimulated no doubt by the activities of the municipal inspectors.

Pigs.—In regard to the pig industry, the Dairy Expert, who also deals with this branch, states :—

> "Throughout 1923 there has been a steady demand for bacon pigs, and good prices have been paid for good animals. There are, however, large numbers of poorly-bred pigs in the country, and farmers would be well advised to get the best breeding stock they can afford, to prevent deterioration in the quality of the pigs which are being sent to the various local bacon factories, of which there are now two in Salisbury and one in Bulawayo.
>
> "There is also a good market for bacon pigs in Johannesburg, and farmers in Matabeleland should take advantage of this market and of the market afforded them by the opening of a newly established bacon factory in Bulawayo."

The total production for 1923 of the three bacon factories at present established, compared with 1922, is as follows :—

Year.	Bacon and hams.	Lard.	Sausages.	Export trade.	
	Pounds.	Pounds.	Pounds.	Pounds.	
1922	466,938	66,208	76,269	108,922	£7,251
1923	527,214	75,636	64,535	76,531	£5,163

The statistical returns for 1923 show that there were at the end of the year 22,441 pigs, against 21,505 twelve months previously and 26,672 in 1921.

Poultry.—The progress of the poultry industry is due to several causes, notably the urgent necessity of many farmers to obtain cash returns and appreciation of the possibilities connected with poultry in this respect, the small capital necessary for poultry raising, and the success of the egg circle; but apart from these influences, the present satisfactory position of poultry on our farms and the benefits accruing therefrom are due to the personal efforts, the faith and the enthusiasm of the Poultry Experts of the Department of Agriculture.

In these difficult times, even small sources of profit cannot be neglected, and poultry have been given a degree of attention they might have lost had our main lines of production been more profitable. This side of farming has now become so firmly established and so well understood that it is not likely ever to look back. Indeed, at present farmers are apt to expect too much of it, and to ask, not only that it shall provide the ready money to pay the wages of the farm and all household expenses, but all other expenditure as well. Undoubtedly the barn door fowl is at present taking a very conspicuous part in carrying farmers through critical seasons and economical difficulties.

The egg-laying test continues to serve useful purposes in stimulating an interest in breeding, creating a healthy rivalry among breeders and encouraging them to produce better and more productive birds; at the same time demonstrating the best methods of housing, tending and feeding fowls for egg production. The results obtained compare favourably with other similar trials elsewhere, and fully confirm belief in the possibilities of Rhodesia for poultry raising. Lectures, shows, demonstrations, autopsies, personal visits, correspondence and contributions to the Press, management of the test and organisation of the egg circle have kept the staff fully occupied throughout the year.

Poultry are in numbers stationary, 160,522 as against 159,109 in 1921, with a drop in 1922, now recovered, but eggs show a satisfactory increase, probably owing to the opportunities for profitable disposal now afforded by the egg circle. The returns furnished indicate a production by farmers of 249,393 dozen or close on three million eggs. In this connection the poultry circle with its branches in many centres has done very much to stabilise and organise markets both within and beyond our borders. The importation of eggs from the south to the Congo and into Rhodesia has been checked, though grocers, bakers and pastry cooks are accused of still getting eggs inferior in size and quality at low prices when they can obtain them, as well as better ones, locally quite as readily.

Progress during the year has been more noticeable amongst the farmers than in towns, and suburban residents are apt to find that the care of poultry on a profit-earning scale is a business which cannot be carried out very well in addition to their commercial or professional life. On the other hand, during the year two or three poultry plants initiated on too large a scale have been reduced to economic proportions. Thus poultry raising is becoming more and more a legitimate branch of farming, often embracing on one farm 100 to 500 birds, and occasionally up to even 1,000 or 1,500 head.

Crops Statistics.—The total area of summer crops under cultivation was 266,607 acres, the highest ever recorded, to which may be added under winter crops about a further 10,000 acres.

The percentage under maize for grain is 82.9 per cent., tobacco occupying 3.4 per cent., maize for silage 2.8 per cent., ground nuts 2.1 per cent., velvet beans 1.8 per cent., sunflowers 1.3 per cent., and beans, potatoes and fodder grasses each about 1 per cent., pumpkins, kaffir corn, sweet potatoes, buckwheat, rice and other crops the remainder.

The total number of farmers is 2,300, and of these 1,805 grew only maize, while 1,488 grew other crops in addition to maize; 160 grew other crops but no maize, and 286 grew no crops whatever. The great bulk of all crops is grown in our maize belt in the districts of Mazoe, Salisbury, Lomagundi and Hartley, also round Bulawayo, Gwelo and Victoria. Tobacco accounts for the cultivation of considerable areas in districts where few other crops are grown.

Maize.—The maize crop, the leading feature of arable farming, proved a record in acreage and yield, the latter amounting to 1,505,580 bags from 220,937 acres. The steady improvement in normal years of the return per acre, which stood last year at the very satisfactory average of 6.8 bags for the whole country and 7.3 bags for the maize belt proper, is a clear indication of the better methods being adopted by maize farmers.

In order to permit our surplus of maize to be accepted and dealt in by the trade of the world, it is necessary to grade it according to standards mutually agreed on between the Union, Portuguese East Africa, ourselves and the principal Corn Exchanges. Much extra work thereby devolves on the farmers, the railways, the dealers and the Government officials in charge. Grading has gone on smoothly and expeditiously, our permanent officials being reinforced during the season by three temporary ones, whilst an arrangement was come to whereby the Government grader at Beira was also employed by this Administration in port inspection and to issue certificates in regard to ships' consignments on our behalf, a plan which has worked well.

The total exports of grain and meal amounted during the year to 789,725 bags, and the amount inspected to 927,882 bags; all grain examined is not necessarily exported. The details of the grading of grain are 232,995 bags passed as first grade, 533,546 bags second grade, 20,480 bags third grade and 33,650 bags rejected, whilst 107,211 bags of maize meal were examined and passed. The charges levied rather more than cover the cost of this service.

Reductions in rail and shipping rates gave some relief during the year, and the grain for export was most expeditiously dealt with, although exceeding in quantity all previous records.

Tobacco.—The principles of co-operation have always been applied in a very special degree in Southern Rhodesia to the tobacco crop, and it is now generally recognised that, without such combination on the part of the growers with the British South Africa Company in establishing the warehouse, and with the Government and buyers who supported the system, our tobacco industry would have languished and certainly never attained the position it now occupies in the Colony. Changes have been many and difficulties not a few. During the year under report a reconstruction occurred under which the Rhodesian Tobacco Co-operative Society was replaced by the Rhodesian Tobacco Warehouse & Export Company, Ltd., which, whilst dropping the unlimited individual financial liability of the old organisation, yet otherwise retains its co-operative character, and introduces improvements, assuring especially a continuity of policy and sounder financial position.

It is probable that ultimately, in place of contracts, a system of open sale will be developed and that markets overseas will be established, to which end it is proposed that the Tobacco Expert shall pay a special visit to England during 1924.

An important change in procedure was adopted during the year whereby no ungraded tobacco was received at the warehouse, but all the crop was either graded by the growers or by commercial graders on their behalf. The system worked well on the whole, and will no doubt further improve as the growers gain experience, particularly as regards condition and baling.

The season was unfavourable for tobacco production, in regard to which the Tobacco Expert furnishes the following returns :—

"Last year, season 1922-23, 7,757 acres were planted to Virginia tobacco, and the total yield was 2,540,942 pounds, or an average of 327 pounds per acre. Compared with the previous year, there was a decrease of 1,250 acres and a reduction in the total yield of 239,162 pounds. The yield per acre was only 8 pounds greater than for 1921-22. The area planted to Turkish tobacco was 1,296 acres, and the total yield was 269,839 pounds, which was an average of 208 per acre. Compared with 1921-22, there was an increase of 129 acres grown, but a decrease of 32,416 pounds in the total amount produced. The average yield of Turkish tobacco was 208 pounds per acre, as compared with 259 pounds for 1921-22."

In this connection it is noticeable that the yield of Rhodesian tobacco is only one-half to two-thirds of that for the same class of crop in the bright tobacco belt of the United States of America. As climatic and telluric conditions in the two countries are so much alike, and obviously favourable in normal seasons, it would appear that the deficiency of yield is capable of very great improvement. This is explained by the Tobacco Expert, no doubt correctly, as being due in part to the intensive methods pursued in Virginia and North and South Carolina, where the average area of tobacco grown on a farm is about five acres, as against fifty in Rhodesia; but also, as he further points out, the heavy yields are due to the accurate information regarding varieties to grow, fertilising, cultural methods, carrying and handling, which will never be available until experiment stations for this special purpose are available to study the problems and to guide the growers.

The season encouraged the growth of bacterial and fungous diseases, including angular spot, wild-fire, and white rust, the identity of all of which has been established by the mycologist. Standard books of reference give information on these diseases, but to devise remedial and preventive measures adapted to our circumstances there are no suitable facilities such as would be provided by proper experiment stations. Disease largely affected quality, and the very wet season rendered the leaf more than usually thin and lacking in body, and greatly interfered with the harvesting and handling of tobacco crops, all of these causes combining to reduce both yield and grade.

Early in the year contracts for sale of leaf were arranged by the Tobacco Co-operative Society to the Tobacco Development Co., Ltd., and to Mr. M. Pevsner on the same lines as in the past, but at slightly higher figures. The whole output for the next three years was thus assured of a sale, although it appears that these prices, though improved, still give some cause for discontent amongst growers, whose share, as compared to the cost of the manufactured article, does seem out of all proportion low.

Rhodesian production is stated to have reached the limit of Union requirements, and if it is to expand, markets abroad must be found. Recognising the position, the Tobacco Development Co., Ltd., and Mr. Pevsner have agreed to forego for two years their rights to the extent of one-tenth of the crop, which is thus liberated to be used for the purpose of testing the London markets and of endeavouring to create outlets overseas for any increase of production which it is hoped may occur in the next few years. Realising the financial difficulties of the Society, the United Tobacco Co. (South) has also liberally agreed to forego rental due on the warehouse.

An important incident in the year's history of tobacco growing was the visit of Mr. F. Strause, of the British American Tobacco Company, a well known leaf expert who has had world-wide experience in the

tobacco trade, and his comments on the industry in this country should be of great value to tobacco growers. In his opinion tobacco growing has prospects of attaining a very great magnitude in Southern Rhodesia. In the development of the industry growers must keep certain basic principles clearly in view. The present costs of growing tobacco are too high, and compare unfavourably with those in other tobacco-producing countries. In his opinion this is primarily due to individuals trying to grow too large acreages, with consequent low yields and loss of efficiency in the labour employed through lack of adequate supervision. He pointed out that because an individual could grow a limited acreage profitably, it does not follow that if the acreage is doubled or trebled profits will increase in proportion; the reverse will most probably result. Mr. Strause pointed out that tobacco is a crop of small acreages the world over, and that, while the proceeds per individual were not great, the aggregate tremendously increased the wealth of the country. After visiting several districts, he was of opinion that the industry was capable of great expansion, but that this must be accomplished by increasing the number of growers, and not by increasing the acreages of those at present growing the crop. This points to the imperative need of a larger farming population.

A conference of various British South African States, including Nyasaland and Northern Rhodesia, was, on the initiative of Southern Rhodesia, convened at Capetown, where a common policy of tobacco growers was formulated and certain important recommendations made in regard to Customs preference, which bore fruit at the Imperial Conference in London later on in the year.

Cotton.—Rhodesian farmers are again becoming interested in cotton cultivation. In 1919-20 a number of farmers, located in several districts, planted trial plots of cotton, the plots ranging in size from one to fifty acres. The results obtained varied from absolute failure in some cases to satisfactory yields in others. The quality of the lint produced was favourably reported upon by brokers and manufacturers in Great Britain. Many farmers wished then to continue cotton growing, but unfortunately the machinery supplied for preparing cotton for market was not very suitable for the purpose, and the production was reluctantly abandoned by farmers, chiefly on account of marketing difficulties. Prices were attractive as compared with former years, but railage and freights were prohibitive.

During the year the attention of farmers has again been aroused to the possibilities of cotton, largely through the propaganda of the Empire Cotton Growing Corporation and by its activities in adjoining countries, particularly Nyasaland, Transvaal and Natal, to the exclusion as yet of Southern Rhodesia. High prices and the removal of transport difficulties made cotton a popular cry and led to a demand all over the country for experiments by farmers themselves. Every encouragement was given by the Government to this movement, but it would have been abortive except for the private enterprise which supplied the necessary seed and fertiliser and the ginnery to deal with any cotton produced. As a result, during the year a considerable acreage was put in to cotton by farmers all over the country, some of which may fail, but much of which promises a very fair measure of success. The natives have also been encouraged to try cotton.

In regard to this crop, our Tobacco and Cotton Expert furnishes the following notes:—

> "The high prices being paid for cotton have caused a revival of interest in the cultivation of this crop. Some 55 tons of seed have

been imported and distributed. In some sections of the country the rains were too late to permit of planting at the proper time, but in other sections climatic conditions have been fairly favourable. The districts in which the bulk of the seed has been planted are Mazoe, Hartley, Lomagundi, Bubi, Nyamandhlovu, although numerous experimental plantings have been made in Makoni, Salisbury, Bulawayo, Victoria and Umtali districts. Seed was also distributed to natives through the Native Affairs Department, for trial in Umtali and Darwin districts."

The crop of cotton harvested in 1923 extended only to 21 acres of experimental plots, but that planted for the coming year is estimated at not less than 3,000 acres.

Barley.—Encouraged by the South African Breweries, Ltd., increased attention has been given during the past two seasons to barley under irrigation and on our naturally moist vleis. It is a pleasure to announce that during the year the use of home-grown barley in the preparation of beer in Salisbury has been realised for the first time, and that it has proved entirely satisfactory, and is likely to be regularly so used in the future.

Ground Nuts.—This crop, valuable from the point of view alike of markets, oversea and local, and suitability, yield, usefulness in rotation and as a farm food, continues to gain in public favour, but more slowly than should be the case. The Chief Agriculturist, whilst on leave in England, made enquiries and ascertained that our leading variety, the Spanish bunch, is well suited both for the roasted trade and for oil extraction, and commands prices which compare favourably from the producer's standpoint with maize. Difficulties as regards implements for dealing with the crop are not insuperable. The acreage recorded (5,436 acres) is not great, and can readily be extended, and the yield of 6.24 bags for the whole country is not to be despised, rising as it does in many individual cases to 15, 20 and even more bags per acre.

Velvet Beans.—From being but little known and regarded with doubt, velvet beans have now firmly established themselves in general favour as a hardy leguminous crop, giving an abundance of valuable fodder, and suitable, if desired, for being ploughed in as a green manure. The area under this crop (4,705 acres) has more than doubled since last year. It is grown mainly in rotation with maize on account of its soil-regenerating properties. Experiments have led to improvements; the white stingless variety seems rapidly to be replacing the original Florida velvet bean, whilst an upright bunch variety in place of the common creeping form bids fair to possess further advantages.

Sundry Crops.—Sunflower is establishing itself as a regular crop useful in rotation, for export and for farm feeding. The production for the year was 17,924 bags off 3,503 acres, and the crop is being more extensively cultivated year by year.

Rice, millets, rotation grasses, potatoes, sweet potatoes, Sunn hemp, dolichos beans, tepary beans, cowpeas, stock melons and pumpkins are being increasingly grown, though generally upon a small scale as yet. In the aggregate the acreage of crops other than maize is steadily extending, the limiting factor being chiefly the question of profitable outlets.

Citrus.—From the statistical returns it appears that there are in Southern Rhodesia 596 citrus orchards on farms with under 200 trees and 60 with over that number, in all 656 citrus growers at the present

time, with every prospect of increase through the creation of new orchards and the splitting up of certain of the larger groves into a number of separate smaller holdings.

That Rhodesia affords great scope for the production of citrus fruit has been abundantly demonstrated through the efforts of a few pioneers, coupled with the labours of the Citrus Adviser attached to the Department of Agriculture. The cultivation and export of oranges has passed beyond the experimental stage, and is now an established branch of the farming industry, as is shown by the following figures, indicating, from the commencement of this trade, the growth of the export business :—

Season.	Boxes.
1916	1,336
1917	nil
1918	nil
1919	2,539
1920	7,675
1921	15,422
1922	22,663
1923	44,760

Gradually, in spite of difficulties and set-backs, citrus growing has extended, and although failures and mistakes have to be recorded, we are now in the position of furnishing about one-eighth of the total of oranges sent overseas from South Africa. The extent of the business may be gauged from the latest statistical returns, which show that the total number of citrus trees is 201,383, of which 148,471 are irrigated. The total figure comprises oranges in bearing 99,247, not yet bearing 73,129, total 172,376; and of other citrus trees in bearing 17,743, and not yet bearing 11,264, total 29,007 trees. From this it will be realised that there will be a greatly increased production in the course of the next few years.

Our orange growers are banded together in the Rhodesian Co-operative Fruit Growers' Association, which in turn is allied with Fruit Growers' Co-operative Exchange of South Africa, Ltd., whereby the interests of all concerned in this trade are combined for mutual advantage. This combination has thoroughly justified its establishment, and has very materially assisted in the organisation and control of the overseas trade in fruit of every description; protecting all interests, regulating shipments, preventing confusion and generally assisting the growers, however remote and isolated, to reach the most distant markets and secure the best returns.

Owing to the peculiarities of the season, South African citrus fruit last season was exceptionally wasty in condition, happily an unusual circumstance. The Exchange, realising the abnormal position and the detrimental effect it might have in foreign markets, wisely inaugurated a system of re-packing at the docks which, though it involved much extra expense, undoubtedly benefited consigners pecuniarily and prevented the reputation of South African oranges from suffering in the markets of the world.

The Exchange has organised for the benefit of its members in the Union and Rhodesia a special propaganda in connection with the British Empire Exhibition in the coming year, raising funds through a levy on fruit exports for this purpose.

The prospects of the citrus industry of Southern Rhodesia are good, and there is every reason to think that, if nursed through the initial stages, oranges will not only furnish an important item of our exports,

but will become the main support of a large number of farmers of a specially desirable class, devoting attention to intensive farming on relatively small holdings and turning to account some of our best stretches of irrigable land.

In this connection the Citrus Adviser may well be quoted :—"During the year under review schemes have been formulated in several sections of the Colony to dispose of farms as small holdings, on each of which will be planted citrus orchards of varying size, which, when they come into bearing, can be operated on co-operative lines for the picking, packing and marketing of their product. It is such schemes as these, some of which have actually been commenced, that will give a real impetus to citrus growing on commercial lines and attract other farmers who have the suitable situations to plant out small and large orchards. Farmers will especially realise, if neighbouring farms all have small orchards which are properly attended to, that these will produce a useful revenue, while the packing and marketing can be done in smaller or larger co-operative packing houses as the acreage planted or volume of fruit raised would require. It is this part of the business that has prevented many farmers from taking up fruit growing in other parts of the world; but closer settlement, accompanied by irrigation and consequent co-operation on proper lines for certain of the orchard operations, has been the means of dispelling their fears as to the difficulties of grading and marketing."

Research.—A large proportion of the activities of the Department of Agriculture consists in the investigation of agricultural problems by trained specialists, conducted in laboratories, on experiment stations and on private farms. Continuous fresh research is called for upon the subjects in regard to which the experts have to submit recommendations to the Government, give advice to farmers and furnish instruction to the present and rising generation and to new settlers. Research and dissemination of knowledge go hand in hand, but to be of the greatest practical utility must be accompanied by local knowledge. This can only be acquired by frequent tours of the different districts and by farm to farm visits. This fund of scientific knowledge acquired by study and research, and this familiarity with local conditions to which it has to be applied, constitute our capital asset. The advice tendered and the benefit derived therefrom are merely the recurring interest on that capital. It is a primary national duty to add to that store of knowledge through our laboratories and experiment farms and by the adequate equipment of our scientific staff.

In the encouragement of agriculture no aspect is more important than experimental work in regard to crops and the maintenance of fertility of soil, which form the basis of all successful farming. So far as funds have allowed in the past, the utmost attention has been devoted to this subject. It can confidently be claimed that the Experiment Farm at the Gwebi and the stations at Salisbury, Bulawayo and Gwelo are exercising a great influence on present farming, and laying down the lines for future farming in a way which most fully justifies their existence. They are proving daily the great problems connected with soils, cultivation, fertility and fertilising; introduction of possible new crops and new varieties and their use in the economy of the farm, and in the minor details of farming operations which vary in every locality. To recapitulate here the work of the past season is unnecessary, since full particulars are regularly published in *The Rhodesia Agricultural Journal*, whilst moreover for proper comprehension of their lessons personal visits by those interested are really essential. The Chief Agricul-

turist is justified in stating as he does in regard to the Salisbury Experiment Station, "It may not be out of place to mention that nowhere in Africa is there a similar crop experiment station where the more important lines of field research have been pursued with such unbroken continuity and from which such convincing and valuable results have been reported." Here more than 500 separate crop experiments were in progress during the year, each forming part of a problem, and each calling for separate and careful field record notes. At the Gwebi Farm 581 acres are devoted to experimental crops, besides veld and pasture experiments, and a score of different crops are grown. For two years an experiment station has been conducted at Bulawayo in conjunction with the Municipality, and the information thus being accumulated is likely to be a powerful influence in time to come. Similarly, the town of Gwelo has now provided the facilities for an experiment station there; a very suitable site has been laid out, and the first year's cropping commenced.

Patience is necessary in dealing with institutions of this sort, for it takes many years to make much progress where only one step every twelve months is possible. Conclusions must not be reached except on the basis of average results over a long period. Initial difficulties of management have to be met and disappointments due to seasons and accident faced, for there is no royal road or short cut to the goal reached through the slow methods of agricultural experimentation. It is not to be understood that our experiment stations are all that they should be; there is still room for improvement. At the Gwebi the programme originally adopted has never been completed, and the farm is very imperfect as regards buildings and equipment; so much so that it is not even as fully productive as an ordinary farm might be, whilst whole branches of farming are unavoidably neglected, including dairying and the utilisation of farm crops through dairying, the full stocking of the farm with cattle and sheep, breeding and the distribution to farmers of high-class stock, and the entire subject of poultry, whilst other branches such as pigs, fruit and forest trees are by no means fully exploited.

The experiment station at Salisbury has, owing to its situation, more nearly reached its limit of usefulness, but it is admirably adapted for the purposes of a plant breeding and seed selection station on the lines which have proved so beneficial in other countries, and this has not yet been attempted seriously for want of funds.

One of the chief agricultural needs yet to be provided is additional experiment farms to meet the requirements of those localities not already served, and to provide facilities for certain crops for which as yet there are none. For many years it has been a source of grievance to farmers and a handicap to the Department that there was no Government experiment farm for the sand veld—that originally established near Lochard having been closed down during the war. A very large proportion of the country belongs to this category. The sand veld presents a number of problems entirely distinct from those confronting the farmer on red soil, and it has altogether different possibilities and requirements, for the study of which no facilities at all exist, all the present experiment stations being, as it happens, upon soils other than granite sand. The sand veld, we know, offers opportunities for growing crops in winter in ways not possible elsewhere, and as yet by no means thoroughly understood. The character of the veld, the chemical composition and the physical properties of the soil, its relation to water, the methods of tillage are all distinct and but imperfectly revealed. Crops peculiarly adapted to the sand veld, such as wheat, barley, oats, rice, ground nuts,

have to be studied, and no doubt others suited to it will yet be found. The methods of stock farming on the sand veld have not yet been investigated scientifically. In her sand veld areas Rhodesia possesses a great source of future wealth, for the full development of which one of the first necessities is the establishment of an agricultural experiment farm.

An important feature of the work of the Department of Agriculture consists in communicating to the public concerned the lessons learned at the experiment stations. This is done through the Press and departmental publications, by lectures, addresses and demonstrations, by visits and conversations, and the measure of publicity given to work done is governed largely by the staff available for giving instruction. Another means of calling attention to new crops recommended for individual trial is by the distribution of seed to applicants, and this is done to a very notable extent. By this means new crops and new varieties are brought into notice and tested in different parts of the country. Without close supervision to follow up the trials, much of the effect of co-operative experiments of this nature is lost, but yet this seed distribution has undoubtedly served a very useful purpose. The need for control by inspectors or instructors is apparent in connection with not only seed distribution, but also with special co-operative experiments organised to enquire into the cost of maize production, maize cultural operations, rotations, fertiliser experiments and the like, and the lack of these officers precludes such work from being placed on a satisfactory footing.

Botany and Mycology.—The study of plants obviously lies at the root of all agricultural science and practice. The functions of an agricultural botanist must primarily be of an economic nature, although no doubt in time a national herbarium of a general character will be established. At present the preliminary steps towards a botanical survey are being taken by the study of the occurrence and distribution of grasses, herbs, trees and all manner of economic plants, edible, medicinal and otherwise useful, poisonous or harmful in other ways. The scope of the work is limited only by the means available, and there is an ample justification for further technical assistance.

The need for the services of a trained mycologist has been forcibly demonstrated by the number and variety of crop diseases that have been submitted for report and advice in the short period since the appointment took effect. They include tobacco, cotton, citrus, potato, apple, maize, velvet bean, field pea, barley, oats, rhubarb, grape, pumpkin, coffee, ground nut, tomato, radish and garden flowers. The loss to the Colony from diseases of crops, largely capable of being remedied or diminished, amounts in the aggregate to a very large sum, and it is evident that there already is more useful work to be done in the field of botany and mycology than can be covered adequately by one man.

Forestry.—The forest officer continued his studies of the natural forest resources of the country, mainly in the districts of Bulawayo, Darwin, Lomagundi, Nyamandhlovu and Wankie.

The forest nursery at Salisbury supplied trees and shrubs to the public, but realised a revenue somewhat less than in the previous year, owing to the unfavourable character of the planting season. The revenue was £1,102.

The work at Mtao Forest, near Umvuma, consisted largely of preliminaries to extensive planting of exotics and the necessary protective and regenerative operations in the indigenous forest. Some 68 acres were planted to gums, cypresses and pines, and a number of experi-

mental plots established. At Mtao the first trees were planted, with fitting ceremony, on 27th January, all present taking part and adding their tree, a record of each being carefully kept. This little ceremony marks the commencement of a work of great importance and considerable magnitude, for there are 13,000 acres which it is hoped to plant up as rapidly as funds allow, except in parts where the indigenous growth warrants it being handled as an existent forest and allowed to reproduce itself by natural means.

Statistics show that on private land throughout the country the total area laid out in plantations extends to only 2,857 acres, of which 2,000 acres are under eucalyptus. This is a trifling figure, and, remembering also the inferior nature of most of our natural bush, indicates a grave prospect in the future, particularly as the world's supplies of softwood such as we use so largely for construction and boxwood are becoming exhausted.

Chemistry.—Several important investigations have been concluded or advanced during the year. Much valuable work is rendered available in a condensed and readily comprehensive form in a report by the Chief Chemist upon the preparation of suitable rations for the feeding of domestic animals, together with information concerning the composition of Rhodesian-grown foodstuffs based on analyses at the Agricultural Chemical Laboratory. A guide and tabulation of this nature has been much wanted for some time past, and its publication marks a step in the progress of stock feeding, enabling farmers to compound from the foodstuffs available the best rations for their dairy cows, fattening oxen and pigs. There is room still for further research in this direction, but a considerable amount of information collected in past years is now presented in a convenient form for reference, and can easily be added to from time to time. Not all our many forms of animal food have yet been chemically examined nor their feeding value ascertained, but enough has been done to meet most practical needs, and this information has been issued at a time when much new interest is being shown in this subject.

In regard to milk production, the question of the standard in use has been brought up, the low quality of milk supplied for consumption in winter in the towns having given cause for enquiry. Over a period of several weeks at the latter end of the dry season samples of milk to the number of 141 were drawn from representative dairies under proper precautions and analysed, twelve from individual cows, the remainder from mixed milk representative of the whole herd. Only one sample of mixed milk failed to satisfy the English milk standard for fat, but $56\frac{1}{2}$ per cent. were below the English standard for solids—not-fat. The results therefore indicated a marked tendency for local milk to contain solids—not-fat—below the English standard, but to what extent this was due to conditions peculiar to the country on the one hand and to the dairy management on the other has yet to be determined. Allied to this is the work of the Dairy Expert in regard to recording production of individual cows.

Other chemical investigations of importance dealt with soil treatment and manuring for maize production on characteristic red soils, which, after four years of cropping at the Salisbury Experiment Station, bring out the desirability of periodically dressing the land with manure or of ploughing in a green crop to augment the humus content. The effect of artificial fertilisers was also demonstrated, and the results obtained provide much valuable information. Other manurial experiments are in progress for crops, notably maize at the Government Farm,

Gwebi, wheat at the Chindamora Native Industrial School and oranges at the British South Africa Company's estates at Mazoe, Sinoia and Umtali, the latter a particularly far-reaching and important enquiry.

A number of enquiries for individuals and many in conjunction with other branches of the public service have also been carried out by the chemists relating to such matters as veterinary drugs, defects in butter paper, curing salt, the ripeness of oranges as influencing packing and export, the sucrose content of sugar cane, toxicological analysis of suspected animal poisoning (mainly arsenical), control of dipping fluid in tanks, lime samples and manurial properties of various products. In addition to the routine duty under the fertiliser law, the examination for advice of numerous soils, waters, dairy products and the publication of reports on work done and instructive articles have all combined to keep the chemists very fully occupied throughout the year.

Entomology.—Protection against one of the most insidious classes of the enemies of mankind is performed by the Entomologists, the importance of whose services is not appreciated or understood by the public generally until panic is occasioned by some of the more spectacular dangers such as locusts, or army caterpillars, or disease transmitted by tsetse or fleas.

Our knowledge with regard to the life of certain pests, and hence of points of attack upon them, has been added to by patient research, notably this year in regard to tsetse, mosquitoes, maize stalk borer, black maize beetle, citrus pests and bean stem maggot.

The year was remarkable for the numerous and serious attacks of many kinds upon our citrus groves, where thousands of pounds worth of damage was recorded. Many remedies were tried and some progress can be recorded, but no very effectual means of cure or prevention have been determined, and further research is needed to fix finally a programme of sprayings and fumigation that may be regarded as an effectual preventive campaign or curative treatment. In addition to the usual scales and aphides, there were extraordinary outbreaks of fruit-piercing moths, citrus codling moth, coreid bug and thrips, all of which took a heavy toll of citrus fruit.

Progress is recorded in experiments with the pests of stored maize and beans.

Under the importation of plants, etc., regulations no fewer than 4,924 consignments were dealt with.

Under the Nurseries Ordinance nineteen registered nurseries have been controlled.

Every preparation in case of a locust invasion has been made; so far happily without need. It is long since locusts were here, and in the event of their appearing the machinery under the existing Locust Destruction Ordinance of 1918 would have to be applied for the first time. This law places upon the occupier of land the onus of reporting to the Native Commissioner the presence of hoppers or the laying of eggs and of destroying hoppers. The Government provides free the necessary materials for poisoning the locusts. In case of failure, the Government may undertake the task at the expense of the occupier. It is very remarkable that with such a widespread and serious devastation in the south, this country should have remained almost exempt from the scourge. We have no assurance against such a calamity, and must be prepared to deal with it where and whenever it appears. Locusts were recorded in Gwanda in May and June, but happily to no serious extent,

whilst two swarms of the unusual grey locust from Portuguese East Africa traversed parts of Mashonaland in September and seem to have returned whence they came.

Tsetse is undoubtedly the gravest danger that we have to face probably in insect or any other form, and has warranted the attention paid to this subject by the Entomologists. The Chief Entomologist makes the following comments, which, in view of the gravity of the subject, deserve close attention :—

> "Extension of the fly areas of the Colony has been recorded during the year in parts of the Darwin, Lomagundi and Sebungwe districts. In the two first named the extension has been accompanied by loss of cattle owned by both Europeans and natives. No record of retrogression other than in the area of the game elimination experiment in the Shangani region has been made. This advance has coincided with general reports of increase of game in certain areas during the past few years, consequent, it is believed, on diminution of hunting both in the free shooting areas and outside, due to the low price and lack of saleability of hides and biltong. The continued steady advance of this pest is, needless to say, creating a very grave situation."

Extension of the fly into occupied parts of the country in Lomagundi and Darwin districts called for special measures involving the co-operation of the Native, the Defence and Agricultural Departments, which will have to be further extended next year, whilst in Melsetter there is uneasiness owing to the deaths of stock from fly disease, although no tsetse fly has so far been found.

All these occurrences demand attention, and unfortunately investigations of this nature in outlying parts and in wild country involving movement on foot with carriers are unavoidably tedious. In addition, the tsetse problem was studied in Hartley district by Mr. Chorley during several months and by Mr. Jack, who made a final inspection of the Shangani area, in which for four years game elimination experiments were conducted with such conspicuous results.

Meteorology.—By analysis of masses of information we are gradually being enabled to understand the climatic conditions under which we live and which regulate every detail of our pastoral and arable farming. These studies, going further, are furnishing the means for reasonably accurate forecasts of the immediate future during the most critical seasons of the year. From 1st November forecasts have been issued at noon daily and telegraphed to twenty centres for distribution to the surrounding farms. They are communicated also to the Press. These forecasts have proved fairly reliable, and have been turned to much practical account by the farmers who receive them. The information upon which they are based is derived from a consideration of combinations of atmospheric pressures, temperatures and winds, obtained from telegraphic information from the Union, Nyasaland, Northern Rhodesia and Portuguese East Africa, and exchanged with observations of the same kind supplied by us from 38 stations in the Colony. There is reason to hope that this weather service may be rendered in course of time even more precise and more detailed as to distribution of coming rain or dry weather in different districts. Such improvements are only to be attained by increasing the sphere and number of the sources of our intelligence and by the accumulation of experience, based on results, following certain combinations of circumstances in the past, which when observed with frequency may be relied upon to bring about certain consequences here. The information collected in the past has been sum-

marised in a report on the climatology of Southern Rhodesia and other publications, some highly technical and some in popular form, on this subject. The raw material for these reports is derived from the daily records of 397 rainfall stations, 13 second order and 31 third order meteorological stations, the control of which is in itself no small task.

Seasonal, as distinct from daily, forecasts have for the past two years been attempted, with some measure of success, although it is thought that further factors than those hitherto available will have to be utilised in order to gain greater precision. The Meteorological Officer states in this connection that "an estimate of this nature appears to be reliable in defining the type of rainfall season only, *i.e.*, whether the season is likely to be an above or below normal one, but the attempt to form an estimate within well-defined limits does not appear to be so trustworthy at present. It can be claimed, however, that this investiga tion is proceeding upon right lines, and is laying the foundation for a more accurate determination in the future when more factors are available."

The Meteorological Report for the season 1921-22 was issued in July, and that for the subsequent season well advanced during the year under report.

Hydrology.—The agriculture of any country is primarily dependent upon its water resources, a comprehension of which is essential to the successful development of its possibilities. The study of this subject is of special importance in a new country, and the attention devoted thereto in Rhodesia has been amply justified. There are now 21 river gauging stations from which the winter flow and maximum flood discharges of rivers from catchment areas of known size and character are being ascertained for guidance in dealing with similar cases where no observations can be made. The run-off from certain dam catchments is also kept, which yields full information as to the flood discharges of these types of catchments. The duty of water, that is, the amount required per acre to attain certain results with irrigated crops, is being observed at Mazoe, but more comprehensive experiments of this sort are very much needed. Data regarding the water power resources of the Colony have also been collected. With the many other calls on the staff available, it is not possible to do as much as the importance of the subject demands.

The engineer in charge of hydrographic and meteorological studies is also concerned in the administration of the Water Ordinance, and in this connection he dealt with 121 applications for water rights during the year. Under that law the total irrigable areas granted on the various river systems during the year were 4,164 acres, as against 13,239 acres asked for. Since this law became operative, the number of grants made, less those subsequently cancelled, is 225 in respect of 21,027 acres, of which, however, only 2,677 acres are returned by grant holders as actually under irrigation in the year under report.

Under irrigation during the dry seasons, certain crops such as wheat and barley are grown which are not possible during the summer, and green fodder crops, which are of inestimable value for dairy stock. There is every reason therefore to encourage the conservation of water for irrigation purposes on as many farms as possible. There is perhaps less call for large irrigation works such as are so beneficial in India and Egypt, or even for schemes of the nature of those found in the Karroo, but there is great advantage to be derived from a number of small irrigation projects, if only of a few acres, on most of our farms.

Irrigation.—Progress can be recorded in the development of irrigation. The new irrigable areas reported upon during the year amounted to 677 acres, making the total investigated to date throughout the country by the irrigation branch 36,102 acres.

Several large projects are now being carried out, and eleven new schemes, involving a capital expenditure of about £15,000, have been completed or were under construction during the year.

The irrigation officers have been fully occupied with their duties of examining and reporting upon irrigation proposals, supervising construction and furnishing advice in connection with farm structures of many kinds. The water supplies of municipalities and townships have been reported upon and assistance given in connection with various Government enterprises. The administration of the Water Law, through the medium of the Water Courts, takes up much of the time of the staff, but is of the first importance in defining and regulating the use of public water on an equitable basis.

Well sinking and water storage in the native reserves have become one of the main activities of the branch, limiting its scope in other directions, but entailing work of undoubted usefulness to the Government and to the native population.

Pounds.—The number of pounds in Southern Rhodesia is forty-eight, one having been established and two abolished during the year.

Brands.—The Brands Ordinance continues to work smoothly, though occasional criticisms are offered by those unconversant with the system in force. It is interesting to observe that the same principle is being followed, after a lapse of fifteen years, in the new brands legislation proposed for the Union. As long as branding stock for purposes of recognition continues to be necessary, the automatic action of such a plan as the three-piece system preventing all possible duplication remains necessary. It is, however, recognised that the value of the hide is very materially diminished by branding, and that it would be an undeniable and very material advantage if a system of permanent marking without injury to the hide could be devised.

Vermin.—Rewards for wild dogs and assistance for organised baboon hunts are still given, but advantage is taken of these inducements to an ever-decreasing extent. Only 512 baboons were killed by such hunts last year. The advantages of destroying vermin far outweigh any attractions of rewards, and no one kills for the sake of this payment alone.

The British Empire Exhibition.—The Department of Agriculture collected from the experiment farms and from many private donors material for the British Empire Exhibition, and prepared a display which it is hoped will prove attractive and be worthy of our agricultural industry. It has been arranged for one officer to devote his time throughout the Exhibition to staging agricultural products and giving information to enquirers in regard thereto, whilst two other members of the Department will visit the Exhibition specially in the interests of the tobacco and citrus industries.

The response of farmers to requests for samples of produce to be sent to the Exhibition was most gratifying, whilst the Government Experiment Farms contributed largely to the collection. The exhibit includes 4,000 specimen ears of our standard varieties of maize, as well as shelled grain and products derived from maize, eight of our leading varieties of wheat, eight varieties of oats, and sheaves and bags of grain

of barley, rye, millets, bales and bundles of fodder crops and native grasses, ground nuts, sunflower, linseed, Niger oil seed, velvet beans, cowpeas, dolichos, haricot and tepary beans, cotton, coffee, buckwheat, native grown crops, preserved fruit, bottled fruit and jams, timber and native plants. The quality is such that, whatever other countries may send, Rhodesia may be quite satisfied with what is shown.

The Rhodesia Agricultural Journal.—As a medium for the dissemination of information, making known results of experiments or investigations and for publishing the views of experts both within and outside the Department of Agriculture on matters of agricultural importance, the twenty-one volumes of *The Rhodesia Agricultural Journal* issued in the past have served the community, and they contain within their pages a vast fund of instruction and a chronicle of progress and discovery. Approval comes both from those most directly served and from abroad, many articles being taken over by the South African Press, and even by contemporaries in distant parts of the world.

Legislation.—No Ordinances of moment to the farmer were passed during the year in the Legislative Council, but important resolutions were carried dealing with the cattle industry and the re-imposition of the duty on wheat and flour, and discussions took place on many agricultural topics in connection with the Estimates.

Education.—A series of twelve lectures and demonstrations of a simple character were arranged at the Boys' High School, Salisbury, and the efforts of the experts met with a very gratifying reception from the boys, many of whom will in time either become farmers or will in other callings necessarily be closely connected with the land. Their intelligent interest and the support of the Principal and staff warmly repaid the lecturers, and the enthusiasm aroused is likely to have far-reaching results in time to come.

Lectures and demonstrations were given by the staff of the Department to the number of 170, whilst at the agricultural shows throughout the country instructive departmental exhibits were staged, and officers attended to meet and give information to farmers.

Departmental.—In order to give a clear indication of the manner in which the time of the technical members of the Department of Agriculture is spent, a tabular statement has been prepared which may be allowed to speak for itself :—

Member.	Number of days.			Farms visited.	Lectures and demonstrations delivered.	Attendances at shows.
	In office.	Out of office.	Total available.			
Chief Agriculturist	88	97	185	78	7	6
Agriculturist	114	34	148	12	3	...
Agriculturist	232	68	300	70	7	5
Chief Chemist	281	19	300	9	2	2
Chemist	241	59	300	...	...	1
Chemist	94	...	94	...	...	...
Chief Entomologist	209	91	300	11	...	...
Entomologist	216	84	300	44	2	2
Entomologist	168	132	300	...	...	...
Agricultural and Irrigation Engineer	213	110	323	174	1	1
Assistant Engineer	182	133	315	65	...	2
Assistant Engineer	29	91	120	2	...	...
Hydrographic Engineer ...	171	60	231	51	1	...
Citrus Expert	165	135	300	117	12	4
Dairy Expert	132	168	300	136	58	6
Poultry Expert	112	121	233	245	28	5
Assistant Poultry Expert ...	232	68	300	130	17	4
Botanist and Mycologist ...	146	10	156	7	...	...
Tobacco and Cotton Expert ...	217	83	300	142	11	3
Assistant Tobacco Expert ...	204	96	300	163	6	3
Forest Officer	206	111	317	43	8	2
Totals	...	...	...	1,499	163	46

The Department of Agriculture deals with very varied public concerns, and requires a staff accordingly diverse in its attainments. Agriculture entails the application of many sciences to the practical problems of production and to the detail of the farmers' daily work. In a young country, moreover, the teachings of the past are not available, and enquiry has to go hand in hand with instruction. Speaking generally, the various technical subjects commonly arising are now represented in our Department of Agriculture.

During the year the staff were more than adequately busy, unforeseen calls on their time at times deflecting their energies and attention from their normal duties. Happily there were no changes by death or retirement. In the clerical staff changes took place, but no improvement or re-organisation other than that consequent upon the creation of a Ministry.

Hearty acknowledgment is due to the entire staff for steady loyal service, for enthusiasm in daily work and for cheerful acceptance of adverse conditions. In the face of drawbacks and difficulties, good progress in every branch has been recorded, the combined efforts of which as time goes on cannot but be of lasting benefit to the agriculture of Southern Rhodesia.

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Director of Agriculture.